

X - REQUIRED POINT AIR HANDLING UNIT (1S-AC1 & 1S-RF) (SIMILAR FOR 15-AC3, AC5, AC6, AC7, AC5 AC11, AC12 & AC13) SUPPLY FAN W/VFD RETURN FAN W/VFD OUTDOOR AIR DAMPER D. RELIEF AIR DAMPER D-3 SMOKE DAMPER SMOKE DETECTOR AFTER FILTER DP2 FINAL FILTER DE OUTDOOR AIR TEMPERATURE TO OUTDOOR AIR HUMIDITY HOA CARBON DIOXIDE SENSOR C MIXED AIR TEMPERATURE I LOW LIMIT TEMPERATURE I FREEZESTAT F2 SUPPLY DISCHARGE TEMPERATURE RETURN AIR TEMPERATURE 14 SUPPLY DISCHARGE HUMIDITY H SPACE HUMIDITY H2 RETURN AIR HUMIDITY HIGH LIMIT HUMIDITY HE STATIC PRESSURE SENSOR SPS STATIC PRESSURE SENSOR SPS-AIR FLOW MEASURING STATION SPACE PRESSURIZATION PO SPACE PRESSURIZATION PL PREHEAT COIL VALVE V-1 HUMIDIFIER VALVE V-3 REFERENCE DRAWING MH702 - VAMC PROJECT # R581-08-113 - REPLACE AHU'S

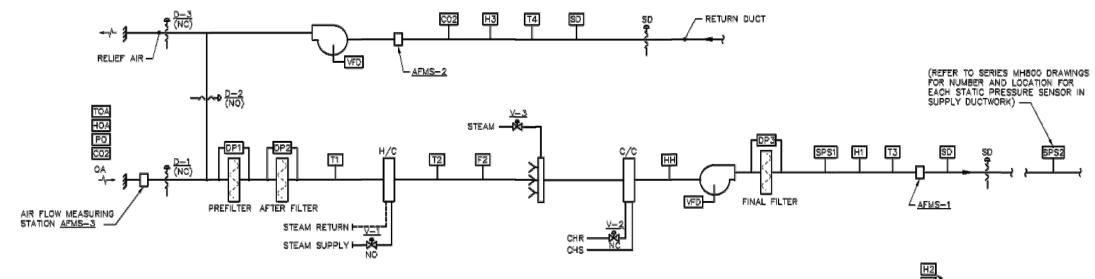
INPUT / OUTPUT SCHEDULE

ANALOG

ANALOG

MEASURED CALCULATED

SYSTEM FEATURES



AIR HANDLING UNIT CONTROL - VARIABLE AIR VOLUME (18-AC2 AND 18-RF2) (SIMILAR FOR 1S-AC3, 1S-AC5, 1S-AC6, 1S-AC7, 1S-AC9,

1S-AC11, 1S-AC12 AND 1S-AC13)

SEQUENCE OF OPERATION:

1.1 SUPPLY AIR FAN AND RETURN AIR FAN OPERATION SHALL BE INTERLOCKED. SUPPLY AND RETURN FANS SHALL OPERATE CONTINUOUSLY IN THE OCCUPIED MODE. H—O—A SWITCH SHALL BE KEPT IN "AUTO" POSITION. IN "OFF" POSITION, D—1 AND D—3 SHALL BE FULLY CLOSED AND D—2 SHALL BE FULLY OPEN. WHEN FANS ARE DE—ENERGIZED, D—1 AND D—3 SHALL RE FULLY CLOSED.

1.2 FANS SHALL BE NORMALLY STARTED AND STOPPED OR OCCUPIED-UNOCCUPIED MODE SHALL BE AS

DETERMINED BY THE ENERGY CONTROL CENTER (ECC). 1.3 PROVIDE SEPARATE, INDEPENDENT LINKAGE CONTROL FOR EACH M.O.D. (D-1, D-2 & D-3).

A. WHEN THE OUTSIDE AIR ENTHALPY IS ABOVE THE RETURN AIR ENTHALPY, D-1, D-2 & D-3 SHALL MODULATE AS FOLLOWS:

1) D-1 (OUTSIDE AIR) SHALL MODULATE TO MINIMUM OUTSIDE AIR POSITION. 2) D-2 (RETURN AIR) SHALL FULLY OPEN

3) D-3 (RELIEF AIR) SHALL MODULATE TO MAINTAIN A POSITIVE BUILDING PRESSURIZATION OF 0.05 IN. WC. AS SENSED BY INDOOR AND CUTDOOR PRESSURE SENSORS (FI VERSUS Fo).

4) D-3 SHALL BE CLOSED WHENEVER BUILDING PRESSURIZATION (PI VERSUS Po) IS LESS THAN 0.01" B. WHEN THE OUTSIDE AIR ENTHALPY IS LESS THEN THE RETURN AIR ENTHALPY, D-1, D-2 & D-3 SHALL MODULATE TO MAXIMIZE ATMOSPHERIC (FREE) COOLING AND MAINTAIN A MIXED AIR TEMPERATURE EQUAL TO THE SUPPLY AIR TEMPERATURE SETPOINT (ADJUSTABLE). THE RELIEF

DAMPER SHALL MODULATE TO MAINTAIN A POSITIVE BUILDING PRESSURE OF 0.05" W.C. (ADJUSTABLE) AS SENSED BY INDOOR AND OUTDOOR PRESSURE SENSORS (PI AND Po). C. THE SUPPLY AIR TEMPERATURE, SENSED BY 13, SHALL THEN BE MAINTAINED AT SETPOINT BY MODULATING V-1 OR V-2 AS REQUIRED. THE SUPPLY AIR TEMPERATURE SETPOINT SHALL BE AS

PER THE FOLLOWING SUPPLY AIR RESET SCHEDULE (ALL TEMPERATURES SHALL BE ADJUSTABLE). OA TEMP ("F) 61 - 70 55

2.2 UNOCCUPIED (HEATING): NIGHT THERMOSTAT SHALL CYCLE FANS AND OPEN HEATING VALVE, V-1 TO MAINTAIN NIGHT SETBACK TEMPERATURE. D-1 AND D-3 SHALL BE FULLY CLOSED AND D-2 FULLY OPEN. WHEN SUPPLY FAN CYCLES 'CN' THE ASSOCIATED VAV TERMINAL DAMPERS SHALL OPEN. BELOW 35 'F OUTSIDE AIR TEMPERATURE, HEATING VALVE SHALL MODULATE TO MAINTAIN

2.3 UNOCCUPIED (COOLING): NIGHT THERMOSTAT AND HUMIDISTAT SHALL CYCLE FAN(S) AND OPEN COOLING VALVE, V-2. TO MAINTAIN NIGHT SETBACK TEMPERATURE AND HUMIDITY SETPOINTS

(ADJUSTABLE). D-1 AND D-3 SHALL BE FULLY CLOSED AND D-2 FULLY OPEN. 2.4 MORNING WARM-UP: WHEN SYSTEM IS FIRST INDEXED TO OCCUPIED, DAMPERS D-1 & D-3 SHALL REMAIN CLOSED, D-2 SHALL REMAIN OPEN, VAV TERMINAL DAMPERS SHALL OPEN, AND FANS SHALL OPERATE WITH HEATING VALVE OPEN UNTIL RETURN AIR, AS SENSED BY T5, REACHES 65 F

3. AIR FLOW / FAN CONTROL

3.1 OCCUPIED: A. STATIC PRESSURE SENSOR, SPS-2, SHALL MODULATE THE SUPPLY FAN VARIABLE FREQUENCY DRIVE, VFD TO MAINTAIN THE SUPPLY DUCT STATIC PRESSURE SETPOINT. WHERE MULTIPLE SENSORS ARE INDICATED ON PLANS, THE PRESSURES SHALL BE AVERAGED.

B. AIR FLOW MONITOR, <u>AFMS—3</u>, LOCATED IN OUTDOOR AIR DUCT SHALL MODULATE D—1 TO MAINTAIN VENTILATION AIR QUANTITY AS INDICATED ON AIR HANDLING UNIT SCHEDULE. AFMS—3 CONTROL SHALL BE OVERRIDED DURING ECONOMIZER MODE.

C. THE ECC SHALL MODULATE THE RETURN FAN VARIABLE FREQUENCY DRIVE TO MAINTAIN AN OFFSET BETWEEN THE SUPPLY AND RETURN FAN AS REQUIRED TO MAINTAIN AN AIR FLOW OFFSET EQUAL TO THE OUTSIDE AIR.

3.2 UNOCCUPIED: DURING NIGHT SETBACK AND MORNING WARM—UP OPERATION, FANS SHALL BE ENERGIZED AS PER 2.2 AND 2.3 ABOVE. RETURN FAN VARIABLE FREQUENCY DRIVE, VFD, SHALL MODULATE TO MAINTAIN FULL AIRFLOW (EQUAL TO SUPPLY AIRFLOW) DURING WARM-UP & NIGHT SETBACK OPERATION.

4.1 HUMIDISTAT, H3, SHALL MODULATE THE HUMIDIFIER CONTROL VALVE TO MAINTAIN THE HUMIDITY SETPONT. HIGH LIMIT HUMIDISTAT, HH, SHALL OVERRIDE THIS CONTROL TO MAINTAIN A MAXIMUM

HUMIDITY OF 85% (ADJUSTABLE). CONTROL VALVE, V-3, SHALL BE CLOSED WHENEVER SUPPLY FAN IS DE-ENERGIZED. 5.1 WHEN THE AIR TEMPERATURE, AS SENSED BY TZ, FALLS BELOW 40°F, AN ALARM SIGNAL SHALL BE INDICATED AT THE ECC. IF THIS TEMPERATURE FALLS BELOW 36 °F, THE UNIT SUPPLY AND

RETURN FAM(S) SHALL DE-ENERGIZE, AND A CRITICAL ALARM SHALL BE INDICATED AT THE ECC, THE HEATING VALVE $\underline{v-1}$ SHALL OPEN FULLY AND THE OUTSIDE AIR DAMPER SHALL CLOSE.

MISCELLANEOUS 6.1 SMOKE DETECTORS, SD. LOCATED IN THE SUPPLY AND RETURN AIR SHALL DE-ENERGIZE FANS AND CLOSE ASSOCIATED SMOKE DAMPERS SHOULD PRODUCTS OF COMBUSTION BE SENSED. ALARM AT

PRESSURE REACHES 6.0" (ADJUSTABLE). ALARM AT THE ECC. 6.3 THE ECC SHALL MONITOR FILTER LOADING ACROSS EACH FILTER BANK. ALARM AT THE ECC.

6.4 PROVIDE OUTDOOR AIR AND RETURN AIR COZ SENSORS AND MONITOR AT THE ECC.

GENERAL NOTES: 1. REFER TO DRAWINGS MH804 THROUGH MH806 FOR LOCATION OF NEW STATIC PRESSURE SENSORS IN SUPPLY DUCTWORK. WHERE MORE THAN ONE SPS IS INDICATED, THE MEASURED VALUES SHALL BE AVERAGED TO CONTROL SUPPLY AIR VOLUME.

REFERENCE CONTROLS DIAGRAM - EXISTING 1S-AC-9, 1S-RF-9

SEQUENCE OF OPERATION FOR AIR HANDLING UNITS FOR SURGICAL SUPPORT/ADMIN/CIRCULATION AREAS (1S-AC-9)

GENERAL

1.1 UNIT (AC-9, RF-9) IS NORMALLY STARTED AND STOPPED REMOTELY VIA THE 3. LOSS OF NORMAL POWER/BAS-INDEXED SHUTDOWN AND AUTOMATIC RESTART BAS (BUILDING AUTOMATION SYSTEM). THE UNIT WILL NORMALLY OPERATE 24 HOURS/DAY WITH OCCUPIED, UNOCCUPIED, AND WARM-UP MODES. H-O-A SWITCH SHALL BE KEPT IN THE "AUTO" POSITION. "HAND" AND "OFF" POSITIONS SHALL BE USED ONLY FOR MAINTENANCE. EXISTING SEQUENCES OF OPERATION ARE TO REMAIN IN EFFECT, BUT SHALL BE CAREFULLY COORDINATED, AUGMENTED, AND/OR REVISED AS NECESSARY TO ALLOW EXISTING UNITS TO SERVE THE NEWLY ASSIGNED AREAS AS INTENDED BY THE CURRENT PROJECT AS INDICATED BY PHASE DEMO/NEW WORK PLANS, EQUIPMENT SCHEDULES, DETAILS, AIRFLOW DIAGRAMS, CONTROL

DIAGRAMS/SEQUENCES, AHU ZONING/PRESSURIZATION PLAN AND SPECS. UNIT REPRESENTS RECENLTY UPGRADED/EXISTING EQUIPMENT TO BE REUSED/RE-ASSIGNED TO SERVICE AREAS AS INDICATED BY PLANS. COORDINATE UNIT OPERATION WITH TAB CONTRACTOR FOR ALL PROJECT PHASES AND THE REQUIRED AIRFLOW VALUES FOR DEMOLITION AND NEW WORK PHASES BASED UPON PROJECT AIRFLOW QUANTITIES INDICATED ON PLANS FOR EACH DIFFUSER, REGISTER AND GRILLE CONNECTED TO THE EQUIPMENT DISTRIBUTION SYSTEM. INTENT IS FOR AREAS AROUND ACTIVE CONSTRUCTION ZONES TO REMAIN POSITIVE WITH RESPECT TO NEGATIVE/DIRTY WORK AREAS AT ALL TIMES. REFER TO ARCHITECTURAL ICRA BOUNDARY DRAWINGS, ICRA SPECIFICATIONS AND COORDINATE WITH TAB CONTRACTOR TO ADJUST SYSTEM AND SPACE AIRFLOW QUANTITIES TO ACHIEVE THIS GOAL WHILE STILL MAINTAINING SPACE COMFORT/TEMPERATURE AND HUMIDITY CONTROLS AS IN ACCORDANCE WITH PRE-CONSTRUCTION

2. UPDATED COOLING COIL CTRL (WITH DEHUMID/ENTHALPY CONTROL & SA TEMP. RESET) 2.1 THE BAS SHALL CALCULATE, DISPLAY, AND CONTINUOUSLY UPDATE THE

CONDITIONS/PRE-CONSTRUCTION TAB REPORTS/TESTING.

SUPPLY AIR DEW POINT TEMPERATURE.

2.2 THE BAS SHALL MODULATE THE CHILLED WATER CONTROL VALVE TO MAINTAIN THE SUPPLY AIR DISCHARGE TEMPERATURE SET POINT.

2.3 THE SUPPLY AIR TEMPERATURE SHALL BE RESET BASED ON THE SYSTEM REHEAT COIL VALVE POSITIONS. THE BAS SHALL DETERMINE THE MOST CLOSED REHEAT COIL CONTROL VALVE IN THE SYSTEM. IF THE VALVE IS

LESS THAN 5% OPEN (ADJ), THE BAS SHALL RESET THE SUPPLY AIR TEMPERATURE SET POINT DOWNWARD IN 0.1° F INCREMENTS TO THE MINIMUM SET POINT. IF THE MOST CLOSED REHEAT COIL VALVE IS OPEN GREATER THAN 15% (ADJ), THE BAS SHALL RESET THE SUPPLY AIR SET POINT UPWARD IN 0.1° F INCREMENTS TO THE MAXIMUM SET POINT OF 65 DEG F (ADJ./VERIFY WITH VAMC). 2.4 IF THE DISCHARGE AIR DEW POINT TEMPERATURE EXCEEDS ITS SET POINT

(50.6 DEG F — ADJUSTABLE), THE BAS SHALL PROVE HUMIDIFICATION ADDITION IS NOT ACTIVE/HUMIDIFIER BLOCKING AND CONTROL VALVES ARE CLOSED. BAS SHALL THEN OVER-RIDE THE SUPPLY AIR DISCHARGE TEMPERATURE CONTROL AND MODULATE THE COOLING COIL CONTROL VALVE TO MAINTAIN THE DISCHARGE DEW POINT TEMPERATURE SET POINT. SHOULD THE CHILLED WATER PLANT/CHILLERS/CHILLED WATER DISTRIBUTION PUMPS BE ON SEASONAL SHUT-DOWN AS PROVEN WITHIN THE BAS AND NO CHILLED WATER FLOW AVAILABLE TO ALLOW DISCHARGE ENTHALPY CONTROL, BAS SHALL ALARM THAT AHU DISCHARGE AIR ENTHALPY HAS EXCEEDED SETPOINT. VAMC TO REVIEW IF EMERGENCY POWER CHILLED WATER SEQUENCE TO BE ENGAGED TO ALLOW DEHUMIDIFICATION OF SUPPLY DISCHARGE AIR DURING PERIODS WHEN SITE CHILLED WATER PLANT HAS BEEN SHUTDOWN.

2.5 THE BAS SHALL NOT PERMIT SIMULTANEOUS AHU HEATING/COOLING OPERATION OR SIMULTANEOUS AHU HUMIDIFICATION/DEHUMIDIFICATION UPON A LOSS OF NORMAL POWER, THE AHU AND ALL ASSOCIATED HVAC COMPONENTS WITHIN THE EXISTING SECOND AND THIRD FLOOR MECHANICAL EQUIPMENT ROOMS/SURGICAL SUPPORT AND ADMIN AREAS ON THE THIRD FLOOR SHALL BE SHUT-DOWN. BAS CONTROLLERS SHALL BE CONNECTED TO EMERGENCY POWER AND INDEX TO BE PREPARED TO RESTART SYSTEMS ONCE NORMAL POWER IS RESTORED. EQUIPMENT SHALL RESTART AUTOMATICALLY WHEN POWER IS RESTORED. COORDINATE PRIORITIZATION RESTART OF AC-9/RF-9 WITH VAMC/COR.

WHEN A SHUTDOWN COMMAND IS GENERATED BY THE BAS, OR AT THE LOCAL AHU CONTROL PANEL, THE AHU WILL DE-ENERGIZE. ALL OUTDOOR AIR, SMOKE AND ISOLATION DAMPERS ON THE AHU AND AT THE EXHAUST FAN/DISCHARGE LOUVER SHALL CLOSE. ALL CONTROL VALVES AT THE AHU SHALL CLOSE. AN ALARM SHALL BE GENERATED WITHIN THE BAS THAT THE AHU IS SHUTDOWN. THE AHU SHALL RESTART AUTOMATICALLY BY FOLLOWING THE NORMAL START-UP SEQUENCE WHEN A REMOTE OR LOCAL START COMMAND IS GENERATED BY THE BAS.

STARTUP OF PROJECT AREA AHU SYSTEMS SHALL BE PRIORITIZED WITHIN THE BAS AS FOLLOWS: AC-16/RF-16, AC-8/EF-8, AC-10/EF-10, EF-15, EF-20, AC-9/RF-9, EF-19.

4. <u>UNOCCUPIED MODE OVERRIDE - TEMPORARY OCCUPIED MODE</u>

COORDINATE UNOCCUPIED MODE SCHEDULE AND DURATIONS BASED UPON FINAL VAMC-APPROVED TIME OF DAY, DAY OF THE YEAR SCHEDULE AND BUILDING/SURGICAL SUITE OCCUPANCY.

HVAC SYSTEM SHALL BE CAPABLE OF BEING INDEXED TO OCCUPIED MODE TEMPORARILY FOR AN ADJUSTABLE PERIOD OF TIME (1 HOUR INITIAL TIME FRAME - VAMC TO CONFIRM) AS INITIATED BY A LOCAL, SECURED, UNOCCUPIED OVERRIDE PUSH BUTTON LOCATED AT THE MAIN SURGICAL SUITE NURSE STATION/CONTROL 3B-159. ACCESS TO ENCLOSURE HOUSING THE PUSH BUTTON SHALL BE VIA KEY AND SHALL BE BY AUTHORIZED AND APPROVED VAMC PERSONNEL ONLY (EXAMPLES OF PERSONNEL INCLUDE VAMC NURSING/SURGICAL STAFF, VAMC FACILITIES ENGINEERS, VAMC SECURITY/CLEANING STAFF, ETC.). REFER TO DRAWING M7.00 FOR LOCATION OF UNOCCUPIED OVERRIDE PUSH BUTTON LOCATIONS FOR EACH NEW/EXISTING AHU SYSTEM SERVING THE RENOVATED AREAS (AC-16, AC-8, AC-10, AC-9).

5. TEMPORARY AC-9/RF-9 100% OA OPERATION - END OF PHASE 3/PHASE 4A

DESIGN INTENT AT END OF PHASE 3 IS FOR AC-9/RF-9 TO TEMPORARILY SERVE THE NEWLY RENOVATED PACU/RECOVERY SUITE COMPLETED IN PHASE 3 COORDINATE THE 100% OUTDOOR/100% RELIEF/NON-RECIRCULATING OPERATION OF AC-9/RF-9 UNTIL MECH CONTRACTOR EXTENDS AC-8/EF-8 SERVICE THROUGH THE PHASE 4A DEMOLITION WORK ZONE TO THE NEW PACU SUPPLY AND EXHAUST MANIFOLD DUCTWORK. COORDINATE WITH TESTING, ADJUSTING AND BALANCING CONTRACTOR AND VAMC/COR FOR THIS TEMPORARY OPERATING CONDITION AND THE TRANSITION OVER TO FINAL SERVICE OF PACU BY EXISTING AC-8/EF-8. RECOMMENDED TIMING OF THIS OPERATION IS DURING SHOULDER SEASONS WHEN 100% ECONOMIZER OPERATION IS COMMON AND COILS/ HUMIDIFIER WITHIN AC-9 WILL SATISFY LOADS DURING 100% OA OPERATION.

GENERAL SHEET NOTES:

SEE DWG. MO.01, MO.02 AND M8.00 FOR GENERAL NOTES, SYMBOLS AND ABBREVIATIONS.

THIS DRAWING IS TO BE USED IN CONJUNCTION WITH ALL OTHER DRAWINGS AND SPECIFICATIONS IN THIS PACKAGE. BAS CONTROLS CONTRACTOR TO COORDINATE WITH ALL TRADES, TAB CONTRACTOR AND VAMC COMMISSIONING AGENT.

COORDINATE WITH TESTING, ADJUSTING AND BALANCING CONTRACTOR FOR ALL OCCUPIED, UNOCCUPIED AND WARM-UP OPERATIONAL MODES. REVIEW AND CONFIRM ALL NEW AND EXISTING HVAC EQUIPMENT, (AC-8/EF-8, AC-9/RF-9, AC-10/EF-10, EF-16, AND EF-20) AND CONTROL SEQUENCES TO ALLOW FOR EACH MODE DESCRIBED HEREIN. REVISE SYSTEM STATIC PRESSURE SET POINTS AND OTHER OPERATING PARAMETERS, INCLUDING OUTDOOR AIR, SUPPLY, RETURN AND EXHAUST AIRFLOW MEASUREMENT AND OFFSET CONTROL VALUES FROM TOTAL SUPPLY AIRFLOW QUANTITIES FOR ALL MODES AS REQUIRED TO ACHIEVE THE OPERATING MODES AND OPERATIONAL SCHEDULES LISTED/DESCRIBED. EXISTING SEQUENCES AS DESIGNED BY OTHERS DURING THE RECENT AIR HANDLING UNIT REPLACEMENT PROJECT (VAMC PROJECT #R581-08-113) ARE SHOWN ABOVE FOR INFORMATION PURPOSES. EXISTING SEQUENCES OF OPERATION ARE TO REMAIN FOR AC-8/EF-8/AC-10/EF-10/AC-9/RF-9 WITH THE EXCEPTION OF THE ADDITIONAL SEQUENCE REQUIREMENTS/MODIFICATIONS INDICATED ON THIS DRAWING/ABOVE.

BAS CONTRACTOR SHALL VERIFY AND DOCUMENT LOCATION OF ALL EXISTING REMAIN/RE-USED/RE-CALIBRATED SENSORS PRIOR TO BEGINNING OF PROJECT/DEMOLITION EFFORTS. REVIEW CONDITION OF THESE SENSING DEVICES AND SALVAGE/REUSE/RECALIBRATE IF POSSIBLE OTHERWISE REPLACE FOR NEW CONSTRUCTION AS REQUIRED. COORDINATE MOUNTING AND LOCATION OF ALL SENSORS WITH TESTING, ADJUSTING AND BALANCING CONTRACTOR AND VAMC AS REQUIRED. RELOCATE SENSORS AS REQUIRED FOR ALL TEMPORARY AND FINAL HVAC SYSTEM OPERATION. IDENTIFY LOCATIONS (TEMPORARY AND FINAL) ON PLANS/CONTROLS SUBMITTAL FOR VAMC RECORD DOCUMENTS/KNOWLEDGE AND INCLUDE WITH O&M SUBMISSION FOR CONTROLS AND SEQUENCES OF

COORDINATE AND CONFIRM ALL FINAL OCCUPIED, UNOCCUPIED, SMOKE PURGE AND WARM-UP PERIODS AND OCCUPANCY SCHEDULES WITH VAMC ENGINEERING PERSONNEL. COORDINATE LOCATION OF ALL SPACE OCCUPANCY SENSORS AND THE DURATION OF THE UNOCCUPIED OVERRIDE PERIOD WHEN INDIVIDUALS SPACES AND/OR THE ENTIRE SUITE IS INDEXED INTO NORMAL OCCUPIED MODE TEMPORARILY. STERILE SURGICAL SUITE SMOKE PURGE MODE IMPACTS AC-8/EF-8 AIR TERMINAL UNITS SERVING SPACES IN SURG SUITE - SEE EQUIP. SCHEDULES AND SEQUENCES.

COORDINATE FINAL LOCATIONS OF SPACE REFERENCE PRESSURE SENSORS, PRESSURE MONITORS, | -PRESSURIZATION ALARM OVERRIDE KEY-SWTICHES, ROOM THERMOSTATS/TEMPERATURE SENSORS, HUMIDITY SENSORS, OCCUPANCY SENSORS, UNOCCUPIED OVERRIDE PUSH BOUTTONS AND OTHER WALL-MOUNTED CONTROLS DEVICES AS PER PLAN DRAWINGS, SPECIFICATIONS AND VAMC SITE ENGINEERING PERSONNEL REVIEW.

REFER TO ELECTRICAL PLANS AND COORDINATE POWER SOURCE FOR NEW HVAC EQUIPMENT AND FOR ALL BAS CONTROLS / CONTROL PANEL(S) AS REQUIRED TO SUPPORT FINAL BUILDING AUTOMATION SYSTEMS BY BAS CONTRACTOR. DESIGN INTENT IS FOR BAS CONTROL AND BAS TO REMAIN OPERATIONAL WHILE HVAC SYSTEMS AND EQUIPMENT ON EMERGENCY POWER REMAIN OPERATIONAL AND WHILE HVAC SYSTEMS AND EQUIPMENT ON NORMAL POWER SHUTDOWN. FOR EXAMPLE, EXISTING AIR HANDLING UNITS, AC-8/AC-10 AND EXHAUST FANS, EF-8/EF-10/EF-16 HAVE BEEN POWERED FROM EMERGENCY POWER SOURCE. THEREFORE, AIR FLOW CONTROL VALVES/AIR TERMINAL UNITS, HYDRONIC CONTROL VALVES AND ASSOCIATED BAS CONTROLS/CONTROL PANELS SHALL ALSO BE POWERED BY EMERGENCY POWER. HVAC EQUIPMENT SHALL RE-START AUTOMATICALLY DURING TRANSITION BACK TO NORMAL POWER. COORDINATE FINAL HVAC EQUIPMENT RESTART SEQUENCE/PRIORTIZATION WITH VAMC SITE ENGINEERING PERSONNEL.

TO DETAIL SHEETS, AIRFLOW DIAGRAMS AND ALL CONTROL DIAGRAMS FOR ADDITIONAL CONTROLS REQUIREMENTS ASSOCIATED WITH AC-10 NEW FINAL-FILTER, AIRFLOW CONTROL VALVES/AIR TERMINAL UNITS, HOT WATER REHEAT COILS, ETC.

Project Number

100% CONSTRUCTION DOCUMENTS **FULLY SPRINKLERED**

CONSULTANTS: MILLER-REMICK LLC PROFESSIONAL ENGINEER

4. OCCUPIED/UNOCCUPIED SYSTEM OPERATION

AND BALANCE CONTRACTOR.

UNIT OCCUPIED/UNOCCUPIED OPERATION IS ESTABLISHED BY THE

RETURN AIR QUANTITIES AS INDICATED ON THE DRAWINGS.

IS POSITIVE RELATIVE TO THE CORRIDOR C3-9.

4.2 THE UNIT SUPPLY FAN SPEED IS SET BY THE DUCT PRESSURE SENSOR AND

OCCUPIED/UNOCCUPIED STATE OF THE CONNECTED CONSTANT VOLUME SUPPLY

THEREFORE MEETING THE FLOW REQUIREMENTS OF THE CONNECTED TERMINALS.

4.3 WHEN THE TERMINALS ARE IN THE OCCUPIED MODE THE EXHAUST FAN IS TO OPERATE

4.4 WHEN THE TERMINALS ARE IN THEIR UNOCCUPIED MODE, THE EXHAUST FAN SPEED

(PRE-OP AREA) IS POSITIVE RELATIVE TO THE CORRIDOR C3-8.1

AT THE SPEED REQUIRED AS DETERMINED BY THE BALANCE CONTRACTOR TO MEET THE

SHALL BE SET TO MAINTAIN PROPER SPACE PRESSURE AS DETERMINED BY THE TEST

4.4.1 FOR 1S-AC-8, THE EXHAUST FAN SPEED SHALL BE ESTABLISHED TO MAINTAIN A

4.4.2 FOR 1S-AC-10, THE EXHAUST FAN SPEED SHALL BE ESTABLISHED TO MAINTAIN

A DIFFERENTIAL OF 0.02 INCHES ACROSS THE DOUBLE DOORS NEAR COLUMNS

G3.-9.1 BETWEEN CORRIDOR C3-9 AND C3-10 SO THAT THE CORRIDOR C3-10

3

DIFFERENTIAL OF 0.02 INCHES ACCROSS THE DOUBLE DOORS NEAR COLUMN

C.2-10.5 BETWEEN CORRIDORS C3-8.1 AND C3-7 SO THAT THE CORRIDOR C3-7

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MECHANICAL CONTROLS REF. CONTROL DIAGRAMS AND SEQUENCE MODIFICATIONS

RENOVATE SURGICAL 581-13-101 **SERVICE & UPGRADE Building Number OPERATING ROOMS** Location HUNTINGTON, WV Drawing Number

Office of Construction and Facilities Management

Department of **Veterans Affairs**

VA FORM 08-6231

DEW POINT TEMPERATURE.

(ADJ./VERIFY WITH VAMC).

WATER PLANT HAS BEEN SHUTDOWN.

DESCRIPTION

SUPPLY AIR DISCHARGE TEMPERATURE SET POINT.

2.2 THE BAS SHALL MODULATE THE CHILLED WATER CONTROL VALVE TO MAINTAIN THE

2.3 THE SUPPLY AIR TEMPERATURE SHALL BE RESET BASED ON THE SYSTEM REHEAT COIL

VALVE POSITIONS. THE BAS SHALL DETERMINE THE MOST CLOSED REHEAT COIL

CONTROL VALVE IN THE SYSTEM. IF THE VALVE IS LESS THAN 5% OPEN (ADJ), THE

INCREMENTS TO THE MINIMUM SET POINT. IF THE MOST CLOSED REHEAT COIL VALVE

BAS SHALL RESET THE SUPPLY AIR TEMPERATURE SET POINT DOWNWARD IN 0.1° I

IS OPEN GREATER THAN 15% (ADJ), THE BAS SHALL RESET THE SUPPLY AIR SET

POINT UPWARD IN 0.1° F INCREMENTS TO THE MAXIMUM SET POINT OF 65 DEG F

F – ADJUSTABLE). THE BAS SHALL PROVE HUMIDIFICATION ADDITION IS NOT

ACTIVE/HUMIDIFIER BLOCKING AND CONTROL VALVES ARE CLOSED. BAS SHALL THEN

OVER-RIDE THE SUPPLY AIR DISCHARGE TEMPERATURE CONTROL AND MODULATE THE

COOLING COIL CONTROL VALVE TO MAINTAIN THE DISCHARGE DEW POINT TEMPERATURE

SET POINT. SHOULD THE CHILLED WATER PLANT/CHILLERS/CHILLED WATER

DISTRIBUTION PUMPS BE ON SEASONAL SHUT-DOWN AS PROVEN WITHIN THE BAS AND

NO CHILLED WATER FLOW AVAILABLE TO ALLOW DISCHARGE ENTHALPY CONTROL, BAS

SHALL ALARM THAT AHU DISCHARGE AIR ENTHALPY HAS EXCEEDED SETPOINT. VAMC TO

REVIEW IF EMERGENCY POWER CHILLED WATER SEQUENCE TO BE ENGAGED TO ALLOW

DEHUMIDIFICATION OF SUPPLY DISCHARGE AIR DURING PERIODS WHEN SITE CHILLED

DATE

2.5 THE BAS SHALL NOT PERMIT SIMULTANEOUS AHU HEATING/COOLING OPERATION OR

SIMULTANEOUS AHU HUMIDIFICATION/DEHUMIDIFICATION OPERATION.

2.4 IF THE DISCHARGE AIR DEW POINT TEMPERATURE EXCEEDS ITS SET POINT (50.6 DEG

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Approved: Medical Center Director

Drawing Title

Drawn Checked 01-15-2016 JLR

BAS POINT DESCRIPTION		HARDWAF	RE POINTS			so	OFTWARE POI	NTS		NETWORK COMMUNICATION	UNITS	GRAPHIC	REMARKS	
	Al	AO	DI	DO	AV	DV	SCHED	TREND	ALARM	BACNET				QTY
OUTDOOR AIR TEMPERATURE	1	•		•	•	•	•	1	•	•	°F	Υ		1
OUTDOOR AIR ENTHALPY (HUMIDITY)	1							1			%RH	Υ	•	1
ZONE PRESSURE MONITOR PANELS - QTY 7										7	-	-	INTEGRATE MONITORING PANELS/SUMMARY PANEL	7
PRESSURE MONITOR ALARM OVERRIDE KEY-SWITCH ACTIVATED	7								7		in w.g.	Υ	POS (OR's), NEG (ISOL RM's) ALARM DISABLED	7
ZONE OCCUPANCY SENSOR	5							5			°F	Υ	MULTI-TECHNOLOGY - COORD MOUNTING HIGH IN ROOM	5
ZONE TEMPERATURE	27							27			°F	Υ	•	27
ZONE TEMPERATURE SETPOINT ADJUST	27										°F	Υ	-	27
ZONE TEMPERATURE OVERRIDE			27								°F	Υ		27
ZONE HEATING SETPOINT											°F	Υ		0
ONE COOLING SETPOINT											°F	Υ		0
ONE AIRFLOW SETPOINT		35			35						CFM	Υ	OCCUPIED, UNOCCUPIED, SMOKE CONTROL	35
IRFLOW CONTROL VALVE (SAV, EAV) AIRFLOW - ISOLATION ROOMS	4				4					4	CFM	Υ		4
NRFLOW CONTROL VALVE (SAV, EAV) DAMPER - ISOLATION ROOMS		4				4				4	%OPEN	Υ	% OPEN FEEDBACK	4
AIR TERMINAL UNIT (TUS,TUR, TUE) AIRFLOW	20										CFM	Υ		20
AIR TERMINAL UNIT (TUS, TUR, TUE) DAMPER		20									%OPEN	Υ	% OPEN FEEDBACK	20
HEATING HOT WATER (REHEAT, UH, RAD) COIL CONTROL VALVE		27									%OPEN	Υ	% OPEN FEEDBACK	27
REHEAT COIL LEAVING AIR TEMP	27										°F	Υ		27
HEATING MODE (WARM-UP)							Υ						SEE SEQUENCES-AC-8, AC-9, AC-10	0
SCHEDULE (OCCUPIED-UNOCCUPIED)							Υ					Υ	SEE SEQUENCES-AC-8, AC-9, AC-10	0
HIGH ZONE TEMP									27		°F	-		0
OW ZONE TEMP									27		°F	-		0
HIGH REHEAT COIL DISCHARGE AIR TEMP									27		°F	-		0
OW REHEAT COIL DISCHARGE AIR TEMP									27		°F			0
EMP GAS STRG RM - (E)1S-EF-11 - START/STOP		1										Υ	TEMP FAN-REMOVE/TURN OVER TO VAMC END OF PH6	1
EMP GAS STRG RM - (E)1S-EF-11 - CURRENT STATUS	1								1		-	Υ	TEMP FAN-REMOVE/TURN OVER TO VAMC END OF PH6	1
IEW GAS STRG RM - 1S-EF-20 - START/STOP		1									-	Υ		1
S-EF-20 - CURRENT STATUS (FAN FAULT)	1								1			Υ		1
E)1S-EF-16 - CURRENT STATUS (FAN FAULT)	1								1			Υ		

1. PROVIDE ANY ADDITIONAL POINTS REQUIRED TO ACHIEVE THE SEQUENCES OF OPERATION AND TO SATISFY THE DESIGN INTENT INDICATED BY CONTROL DIAGRAMS, PLANS AND SPECIFICATIONS. COORDINATE ALL INTEGRATION WITH EQUIPMENT MANUFACTURERS.

							ystem			D:		ysten	ı Inpu				A 1 -			Syste					4 : ~			Digita	l Com	mur	nications			$\overline{}$	
	Point ID	Applies To Both Base and Deductive Alternate Bids	Applies to Deductive Alternate Bid Only	Applies to Base Bid Only	Device Fail Position (O)- Open, (C)- Closed	Electric <u>g</u>	Pneumatic A	Electric B	Pneumatic Bog	Status	Temperature	Pressure	Humidity	alog	Current		Equipment Status	Low Limit	High Limit	Start/Stop		Temperature Control	Test Test	Control	Humidity Control	Humidity Reset		ating Speed			Amps (Actual and Precent of Full Capacity Amps)	Graphic Display	Trending		
SYSTEM COMPONENT HOA On/Off	& HS		Ap	Ap	O o		P	Ele	Pn		Ter	Pre	꾸	Flow	Cu	Data	<u>Б</u>	<u> </u>	<u>ਜ</u>	Scl	<u> </u>	Ter L		<u>ੇ</u> ਲੋ	로	로		<u>රි </u>	Sta	Fault	Pre Ca		Tre	R	Remark
Return Air Temperature	TT-1	•				•				•	•								78													•	•		
Return Air Humidity	MT-1	•											•					20	60							•						•	_		
Outside Air Temperature	TT-2	•									•												•									•			
Outside Air Humidity	MT-2	•											•										•									•			
Mixed Air Temperature	TT-3	•									•							45														•			
Preheat Coil Leaving Temperature	TT-4	•									•							45	80													•			
Cooling Coil Leaving Temperature	TT-5	•									•								62													•			
Supply Air Temperature	TT-6	•									•								66													•	•		
Supply Air Humidity	MT-3	•											•						85						•							•			
Supply Static Pressure	SPT-1	•										•												•								•			
Return Static Pressure	SPT-2	•										•												•								•			
Return Fan On/Off	SST-1	•				•														•															
Return Fan On/Off	SST-2	•				•														•															
Return Fan On/Off	SST-3	•				•														•															
Return Fan On/Off	SST-4	•				•														•															
Return Air Flow	FT-1	•		\perp										•																		•			
Return Air Flow	FT-2	•												•				_														•			
Return Air Flow	FT-3	•					_							•																		•			
Return Air Flow	FT-4	•					_							•				_														•			
Return Fan Speed	SC-1	•					_	•										_						•											
Return Fan Speed	SC-2	•					_	•										_						•											
Return Fan Speed	SC-3	•					_	•										_						•											
Return Fan Speed	SC-4	•					_	•										_						•											
Return Fan VFD	COMM	•					_										•	_										-	•	•	•	•			
Return Fan VFD	COMM	•					_										•	_									_		•	•	•	•			
Return Fan VFD	СОММ	•					_										•	_									_	-	•	•	•	•			
Return Fan VFD	COMM	•															•											•	•	•	•	•			
Return Fan Isolation Damper	ZC-1	•			<u>C</u>	•																													
Return Fan Isolation Damper	ZC-2	•			С	•																													
Return Fan Isolation Damper	ZC-3	•			С	•																													
Return Fan Isolation Damper	ZC-4	•			С	•																													
Return Fan Damper End Switch	ZS-1	•								•							•				_											•			
Return Fan Damper End Switch	ZS-2	•								•							•				_											•			
Return Fan Damper End Switch	ZS-3	•								•							•				_			_								•			
Return Fan Damper End Switch	ZS-4	•								•							•															•			
Supply Fan On/Off	SST-5	•				•														•	_			_											
Supply Fan On/Off	SST-6	•				•														•	_			_											
Supply Fan On/Off	SST-7 SST-8	•				•														•	+														
Supply Fan On/Off	FT-5	•				•														•	+	+													
Supply Air Flow	FT-6	•												•							+	-		-								•			
Supply Air Flow	FT-7	•												•																		•			
Supply Air Flow Supply Air Flow	FT-8	•												•		-					+			_								•			
Supply Fan Speed	SC-5	•												•							\dashv			\rightarrow								•			
Supply Fan Speed	SC-6	•						•														+		•											
Supply Fan Speed	SC-7	•						•														+		•											
Supply Fan Speed	SC-8	•						•													\dashv			•											
Supply Fan VFD	СОММ	•															•				+							•	•	•	•	•			
Supply Fan VFD	COMM	•															•				\dashv								•	•	•	•			
Supply Fan VFD	COMM	•	 	+ +			+										•	+	+		+			+					•	•	•	•			
Supply Fan VFD	СОММ	•		+ +			+										•				\dashv		+	\dashv			_		•	•	•	•			
Supply Fan Isolation Damper	ZC-5	•		+ +	С	•	+											+			\dashv			+				-	-	-		-			
Supply Fan Isolation Damper	ZC-6	•		+ +	C	•	+											+			\dashv			+		+									
Supply Fan Isolation Damper	ZC-7	•		+ +	C	•	+											+			\dashv			\dashv											
Supply Fan Isolation Damper	ZC-8	•		+ +	C	•	1											1																	
Supply Fan Damper End Switch	ZS-5	•								•							•				+			\dashv								•			
Supply Fan Damper End Switch	ZS-6	•		+ +						•							•				+			+								•			
Supply Fan Damper End Switch	ZS-7	•		+ +						•							•				+			+								•			
Supply Fan Damper End Switch	ZS-8	•					<u> </u>			•							•	1														•			
Supply High Pressure	PSH-1	•					<u> </u>										1	1	•													•			
Return Low Pressure	PSL-1	•					1											•			+			+								•			
Minimum Outside Air Damper	ZC-9	•		† †	С			•																•								•			
Economizer Outside Air Damper	ZC-10	•			С			•														•	•									•			
Return Air Smoke Damper	SD	•			С	•	1											1			+			+											
Return Air End Switch	ZS-10	•								•							•							+								•			
Return Air Economizer Damper	ZC-11	•			0			•														•	•									•			
Supply Air Smoke Damper	SD	•		1 1	С	•																		+											
Supply Air End Switch	ZS-9	•		1 1						•							•															•			
Exhaust Air Damper	ZC-12	•			С			•														•	•									•			
Preheat Steam Control Valve	TC-1	•			С			•														•										•			
lumidifier Capacity Control Valve	HC-1	•			С			•																	•							•			
lumidifier Block Control Valve	HS-1	•			С	•																			•							•			
Cooling Coil Chilled Water Valve	TC-2	•			С			•														•										•			
Pre Filter Pressure Drop	PDS-1	•								•									0.5													•			
ntermediate Filter Pressure Drop	PDS-2	•								•									0.7													•			
IEPA Filter Pressure Drop	PDS-3	•		1 1						•									1.7													•			
Init Heater Steam Control Valve	TC-3	•		1 1	0																+			+								•			
	1			1			T											T			\neg	-	-				_			-					
Init Heater Fan	SST-9	•							,	l	1										I				l	l						•	1		

100% CONSTRUCTION DOCUMENTS **FULLY SPRINKLERED**

		CONSULTANTS:	MILLER-REMICK LL PROFESSIONAL ENGIN
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			14634/1
			STATE OF OF VIRGINIA
DESCRIPTION	DATE		TITIOS / ONAL ENGINE

ARCHITECT / ENGINEERS:





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Drawing Title

MECHANICAL CONTROLS POINTS LISTS Approved: Medical Center Director

Project Title
RENOVATE SURGICAL Project Number Office of 581-13-101 **SERVICE & UPGRADE** Building Number **OPERATING ROOMS** Location HUNTINGTON, WV Drawing Number

JLR

Checked

01-15-2016

Construction and Facilities Management Department of Veterans Affairs

VA FORM 08-6231

16

one quarter inch = one foot

one half inch = one foot

three eighths inch = one foot

one half i